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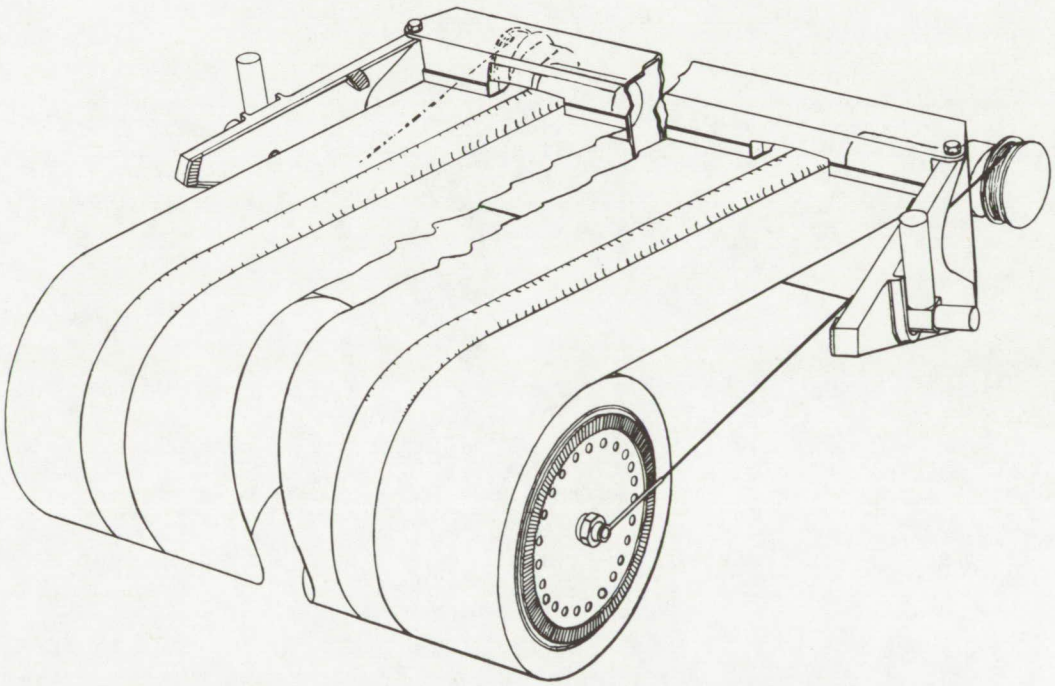
NASA TECH BRIEF

Ames Research Center

Solar Array Deployment from a Spinning Spacecraft



Techniques for deploying solar arrays from spacecrafts usually involve simple combinations of motor drives and pyrotechnic devices, but since the mechanical devices which are used to deploy arrays from a spinning spacecraft are even more complex, mission success may be jeopardized. It is possible that deployment can be accomplished with more certainty by devices which utilize the natural centrifugal forces generated by the spinning motion of the spacecraft.

A cylindrical drum, wrapped with a flexible solar array of solar cells mounted on a Mylar sheet, is held by two end-fittings with a cable passing through the axle of the drum. As shown in the diagram, the end-fittings are attached on pivots to a strongback beam which, in turn, provides a means for attachment to the spacecraft. The drum is held in place by compressive forces from the support fittings, and it is prevented from rotating either by friction (because of compressive forces) or, more positively, by serrations on the rings which bear the compressive force of the support fittings.

The drum is held to the end-fittings by an axial cable (under tension) through the drum axle; the drum is released for deployment when the cable is cut at each end and the end-fittings spring outward. The drum is restrained from free deployment by two control cables attached at each end of the drum axle. The control cables are payed from a constant-speed spool at a rate controlled by a small motor and gear train; alternatively, speed can be controlled either by an escapement mechanism actuated by an electrical pulse or by a centrifugal governor.

(continued overleaf)

Note:

Requests for further information may be directed to:

Technology Utilization Officer
Ames Research Center
Moffett Field, California 94035
Reference: B74-10048

Patent status:

NASA has decided not to apply for a patent.

Source: Arthur H. Carlin, James B. Gardner, and Herbert A. Lassen of TRW, Inc. Systems Group under contract to Ames Research Center (ARC-10787)